

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Patent of:

TAKENAKA et al.

Patent Number: 7,530,410 B2

Issued: May 12, 2009

For: LEGGED MOBILE ROBOT AND CONTROL SYSTEM THEREOR



ATTN: CERTIFICATE OF  
CORRECTIONS BRANCH

10593493 cfe

**REQUEST FOR CERTIFICATE OF CORRECTION**

Commissioner of Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

June 15, 2009

Sir:

The undersigned requests that a Certificate of Correction be issued for the above-identified patent as indicated on the attached Form PTO-1050.

**REMARKS**

This request is being made in order to correct the errors in Claim 1, Column 30, line 6. A copy of claim 1 is enclosed which indicates the corrections for Claim 1. Claim 1, Column 30, line 6 ...bendable range from... should read ...bendable range **of the toe** from

It is respectfully submitted that no new matter has been added.

Since these errors appears to be Patent Office printing errors, it is respectfully submitted that no fee is required. If, however, any fees are due, please charge Counsel's Deposit Account No. 50-2222.

Respectfully submitted,

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Enclosures: PTO Form 1050  
Copy of Claim 1

**Certificate**  
JUN 17 2009  
**of Correction**

UNITED STATES PATENT AND TRADEMARK OFFICE  
**CERTIFICATE OF CORRECTION**

PATENT NO. : 7,530,410 B2

DATED: May 12, 2009

INVENTOR(S) : TAKENAKA et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column 30,

Claim 1, line 6, change "bendable range  
from" to --bendable range of the toe from--

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@ 304 per page

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spring, carbon or the like imparted with elasticity is preferable from the viewpoint of weight reduction.

Further, although a damper and a friction brake have been given as examples of the bending angle holder for holding the bending angle of the toe and the bending angle change suppressor for suppressing the bending angle change, they are of course not limited to these. For example, it is possible to use a ratchet mechanism as the bending angle holder. When a damper or friction brake is used as the bending angle holder, the bending angle can be held anywhere in the continuum of angles within the movable range of the toe. In contrast, in the case of a ratchet mechanism, the angle is held at any among multiple angles corresponding to the number of gears of the ratchet (i.e., holding within the range of the ratchet feed angle is not possible, so that the angles the ratchet mechanism can hold are not continuous), but there is the merit of no operation being necessary at the time of holding the bending angle.

#### INDUSTRIAL APPLICABILITY

According to this invention, in a legged mobile robot, the configuration is such that each foot comprises a foot main body and a bendable toe provided at the fore end of the foot main body, and a bending angle holder capable of holding the bending angle of the toe is provided. Further, in a control system of the legged mobile robot, the configuration is such that the bending angle of the toe is held at a first time point at the liftoff time of the leg or prior thereto and the toe is restored to the initial position at a second time point after the leg lifts off. As a result, the bending angle at the time of liftoff can continue to be held even after the leg lifts off, whereby the posture can be prevented from becoming unstable owing to the toe contacting the floor immediately after liftoff. Further stability during tiptoe standing can be enhanced.

The invention claimed is:

1. A legged mobile robot having a body and legs whose upper ends are connected to the body and whose lower ends are each connected to a foot to be movable when the legs are driven, wherein

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the foot comprises:

a foot main body connected to each of the legs;  
a toe provided at a fore end of the foot main body to be bendable with respect to the foot main body; and  
a bending angle holder capable of holding a bending angle of the toe in a bendable range from zero degree at which a contact area of the foot becomes maximum to a predetermined degree, the bending angle holder holding the toe at the bending angle comprising one from among the zero degree, the predetermined degree and an arbitrary angle between the zero degree and the predetermined angle.

2. The legged mobile robot according to claim 1, further including:

a bending angle change suppressor that suppresses change of the bending angle of the toe.

3. The legged mobile robot according to claim 1, wherein the toe is made continuous with the foot main body and is made of an elastic material that bends with flexing.

4. The legged mobile robot according to claim 1, wherein the toe is connected to the fore end of the foot main body through a rotational shaft capable of rotating about a pitch axis.

5. The legged mobile robot according to claim 4, further including:

an urging means for urging the toe in a direction of restoring it to an initial position.

6. The legged mobile robot according to claim 1, wherein the bending angle holder comprises a friction brake.

7. The legged mobile robot according to claim 2, wherein the bending angle change suppressor comprises a damper.

8. The legged mobile robot according to claim 2, wherein the bending angle holder and the bending angle change suppressor comprise a friction brake whose frictional force is made adjustable.

9. The legged mobile robot according to claim 2, wherein the bending angle holder and the bending angle change suppressor comprise a damper.

\* \* \* \* \*

of the  
toe